What is claimed is:

1. A method of manufacturing a nitrogen-based semiconductor layer, comprising the steps of:

growing the nitrogen-based semiconductor layer on a provisional substrate which forms a heterojunction with the nitrogen-based semiconductor layer; and

etching out the provisional substrate by the use of an etchant for the provisional substrate to leave only the nitrogen-based semiconductor layer as a nitrogen-based semiconductor substrate.

2. A method as claimed in claim 1, further comprising, before the etching step, the step of:

covering the nitrogen-based semiconductor layer with a protection layer against the etchant;

the etching step being carried out with the nitrogen-based semiconductor layer covered with the protection layer to etch out the provisional substrate and to thereby leave the nitrogen-based semiconductor layer and the protection layer.

3. A method as claimed in claim 1, wherein the nitrogen-based semiconductor layer is formed by a nitrogen-based semiconductor thick film.

4. A method as claimed in claim 1, wherein the nitrogen-based semiconductor layer implements a nitrogen-based semiconductor device structure.

5. A method as claimed in claim 1, further comprising the step of:

processing the nitrogen-based semiconductor substrate into a nitrogen-based semiconductor device after the provisional substrate is etched out.

6. A method as claimed in claim 2, further comprising the step of:

processing the nitrogen-based semiconductor substrate into a nitrogen-based semiconductor device after the provisional substrate is etched out.

7. A method as claimed in claim 6, wherein the nitrogen-based semiconductor device has an electrode formed by the protection layer.

8. A method as claimed in claim 1, wherein the provisional substrate is a sapphire substrate while the etchant is formed by a mixed solution of phosphoric acid and sulfuric acid or another mixed solution including the phosphoric acid and the sulfuric acid.

9. A method as claimed in claim 2, wherein the protection layer is formed by at least one material selected from a group consisting of Au, Pt, Ti-Au, Pd-Au, Ni-Au, Ti-Pt-Au, AuZn, and AuGe.

10. A method as claimed in claim 1, wherein the nitrogen-based semiconductor layer includes either $In_xGa_{1-x}N$ ($0 \leqq x \leqq 1$) or $Al_xGa_{1-x}N$ ($0 \leqq x \leqq 1$).

11. A method as claimed in claim 1, wherein the nitrogen-based semiconductor layer includes at least two components selected from a group consisting of $In_xGa_{1-x}N$ ($0 \leqq x \leqq 1$), $Al_xGa_{1-x}N$ ($0 \leqq x \leqq 1$), and $Al_xInyGa_{1-x-y}N$ ($0 \leqq x + y \leqq 1$).

12. A method as claimed in claim 8, wherein the sapphire is etched out by the use of the etchant kept at a temperature not lower than 300℃.

13. A method as claimed in claim 4, wherein the nitrogen-based semiconductor device structure forms a semiconductor laser, a light emitting diode, and/or a field effect transistor.

14. A method as claimed in claim 1, further comprising the step of:

polishing the nitrogen-based semiconductor layer on its surface faced to the provisional substrate so as to flatten the surface.